



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Seney National Wildlife Refuge

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Seney, MI 49883

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Applied Sciences Program Mission Statement

Land management for ecological integrity is an art, guided by science. Knowledge of the natural world is obtained through research, the application of the “scientific method,” and by other personal experiences. At Seney NWR, the goal of the Applied Sciences Program is to be a leader among National Wildlife Refuge System land units in the promotion of contemporary and novel ideas and concepts pertinent to the broad-scale conservation, restoration, and preservation of ecological patterns and processes for wildlife benefit. In doing so, the Applied Sciences Program will foster the ideas and concept of the 2009 *Comprehensive Conservation Plan* and 2013 *Habitat Management Plan* for Seney NWR and its satellite refuges by acting as a *de facto* Land Management and Research Demonstration Area and integrate applied research, land management, and tertiary education. In the process, we hope to instill a culture of “science” in which work is critically evaluated, constructive conflict is encouraged, and high-value accomplishments are rewarded.

Integration with the 2011 NWRS *Conserving the Future* Document

National Wildlife Refuge System (NWRS) policy has changed through the years. The 1997 *Improvement Act* and 2001 *Biological Integrity Policy* provide significant guidance as does the 2011 *Conserving the Future* document. The latter outlines the vision for the NWRS moving forward. Many of the visions, recommendations, or general theory stated in this document directly applies to the Applied Sciences Program:

1. Under Conservation Planning and Management a vision: *We embrace a scientific, adaptive, landscape-level approach to conserving, managing and restoring refuge lands and waters, and work to project conservation benefits beyond our boundaries.*
2. Adaptive Management is defined: *A deliberate, science-based process for decision making in the face of uncertainty. This approach treats management actions as experiments, and uses the outcomes of those experiments to inform and improve future actions. Because it is based on a continual learning process, adaptive management improves long-term management outcomes.*
3. Ecological Resilience is defined: *The capacity of a system to resist and recover from natural or human-caused disturbances. Resilient systems can maintain their essential structure in the face of floods, fires, pest outbreaks, pollution and other stressors.*
4. Under a Commitment to Science a vision: *We are committed to a culture of scientific excellence, adhering to the highest standards of integrity and transparency, and are viewed as valued contributors to the broader scientific community.*
5. Under Deliberate Research Agenda a recommendation: *Develop and clearly articulate a research agenda for the Refuge System that is management-oriented and grounded in the testing of assumptions, with the explicit purpose of reducing uncertainty in our planning and management decisions.*
6. Under Communication, Collaboration and Contribution in Science a recommendation: *Become a major contributor to the scientific community by sharing information and data; publishing scientific findings; participating in professional societies; and engaging with local, regional and national organizations and communities to solve conservation problems.*

How Does the Applied Sciences Program Operate?

The ideals and operational approaches of the Applied Sciences Program mirror that of the scientific method and the guidance documents listed above. We strive to run a program that approaches work similarly to the process of writing grants, writing research papers, and teaching college classes. Specifically, the Applied Sciences Program seeks to be selective, focused, organized, accountable, timely, repeatable and efficient. We do this by promoting the following behaviors:

- the vast majority of planning is done during the “off season” and all activities are designed and approved at that time;
- strict adherence to “chain of command” and “division of labor” improves communication and efficiency;
- discussions are held by establishing appointments, especially during the busy field season;
- the past performances of collaborators and their ability to enhance the Applied Sciences Program (not simply participate) are major considerations for determining involvement (e.g., resumes, CVs, etc. may be expected).

In general, we cannot do all things. Just like reviewers of research grants and papers and educators selecting students for higher-level degrees, we must often say, “no, thank you.” Our work is not for everyone; approximately ½ of past interns have gone on to graduate school and other work for which their experience with the Applied Sciences Program prepared them. The other ½ realized this is not for them. This is viewed as a successful outcome. Trying to please everyone and spreading ourselves thin leads to poor quality work or inefficient work and does not promote professionalism that will lead to improvement in the future work force.

Expectations of Summer Interns, Graduate Students, Etc.

Together with the internship announcement used as part of the application process, the below represents expectations of summer assistants and students working with or for the Applied Sciences Program. Although consideration will be given to providing summer assistants a diversity of experiences, their role is to aid the Applied Sciences Program with accomplishing its yearly work goals and objectives, first and foremost.

- Work safely and communicate any safety concerns directly to your supervisor (Greg Corace) and other staff in the chain of command (Sara Siekierski, Refuge Manager; Greg McClellan, Assistant Manager; Laurie Tansy, Administrative Assistant) if this is not possible. CC: me on **everything**.
- Be prepared for most work days to start at 0730 h and end at 1700 h.
- Because most activities are weather-dependent, be prepared to be flexible with work schedules, etc. Work may occur in rain or other inclement weather.
- Unless an emergency, work with your supervisor to set up meetings to discuss issues.
- In general, timeliness is of the essence. Be 5 minutes early to everything.
- Communication is key; don’t be timid, say what you need to say, but say it succinctly. Individual opinions/ideas matter.
- **Don’t assume anything.** You may work some weekends and evenings. Work with me at least a week out to make sure I don’t have plans for these times.
- Be prepared to not always have computer access. It is hoped that the intern will have their own laptop, but not expected. Wireless connection is provided, free of charge, at the office, but not at the housing unit.

List of Required Reading

(*these papers can be found at: <http://www.fws.gov/midwest/seney/research.html>)

Note: papers are listed in the order they should be read; context first, examples later.

Hunter, M.L., Jr. 2005. A mesofilter conservation strategy to complement fine and coarse filters. *Conservation Biology* 19:1025-1029.

Franklin, J.F. 1993. Preserving biodiversity: species, ecosystems or landscapes? *Ecological Applications* 3:202-205.

Simberloff, D. 1997. Flagships, umbrellas, and keystones: is single species management passé in the landscape era. *Biological Conservation* 83:247-257.

Crow, T.R. and A.H. Perera. 2004. Emulating natural landscape disturbance in forest management-an introduction. *Landscape Ecology* 19:231-233.

Holling, C.S. and G.K. Meffe. 1996. Command and control and the pathology of natural resource management. *Conservation Biology* 10:328-337.

Schroeder, R. L., J. I. Holler and J. P. Taylor. 2004. Managing National Wildlife Refuges for historic and non-historic conditions: determining the role of the refuge in the ecosystem. *Natural Resources Journal* 44:1185-1210.

Scott, J.M., T. Loveland, R. Gergely, J. Strittholt and N. Staus. 2004. National Wildlife Refuge System: ecological context and integrity. *Natural Resource Journal* 44:1041-1066.

Gopen, G.D. and J.A. Swan. 1994. The science of scientific writing. *American Scientists* 78:550-558.

*Kowalski, K., and D. Wilcox. 2003. Differences in sedge fen vegetation upstream and downstream from a managed impoundment. *The American Midland Naturalist* 150:199-220.

*Bork, S.W., Pypker, T.G., Corace, R.G. III, Chimner, R.A., A.L. Maclean and J.A. Hribljan. 2013. A case study in large-scale wetland restoration at Seney National Wildlife Refuge, Upper Michigan, USA. *American Midland Naturalist* 169:286-302.

*Corace, R.G. III, L.M. Shartell, L. A. Schulte, W.L. Brininger Jr., M.K.D. McDowell, and D.M. Kashian. 2012. An ecoregional context for forest management on National Wildlife Refuges of the Upper Midwest, USA. *Environmental Management* 49:359-371.

*Drobyshev, I., Goebel, P.C., Hix, D.M., Corace, R.G. III and M. Semko-Duncan. 2008. Pre- and post-European settlement fire history of red pine-dominated forest ecosystems of Seney National Wildlife Refuge, Upper Michigan. *Canadian Journal of Forest Research* 38:2497-2514.

*Drobyshev, I., Goebel, P.C., Hix, D.M., Corace, R.G. III and M. Semko-Duncan. 2008. Interactions among forest composition, structure, fuel loadings and fire history: a case study of red pine-dominated forests of Seney National Wildlife Refuge. *Forest Ecology and Management* 256:1723-1733.

*Corace, R.G. III, Stout, A.T., Goebel, P.C. and D.M. Hix. 2013. Snag benchmarks and treatment options for mixed

red-pine forest restoration in eastern Upper Michigan. *Restoration Ecology* 21:608-616.

*Corace, R.G. III, Goebel, P.C., Hix, D.M., Casselman, T. and N.E. Seefelt. 2009. Applying principles of ecological forestry at National Wildlife Refuges: experiences from Seney National Wildlife Refuge and Kirtland's Warbler Wildlife Management Area, USA. *The Forestry Chronicle* 85:695-701.

- *Corace, R.G., III. and P.C. Goebel. 2010. An ecological approach to forest management for wildlife: integrating disturbance ecology patterns into silvicultural treatments. *The Wildlife Professional* 4:38-40.
- *Corace, R.G. III, Leister, K.P. and E. Brosnan. 2008. Efficacy of different glyphosate concentrations in managing glossy buckthorn (*Frangula alnus*) resprouts at Seney National Wildlife Refuge, Upper Michigan. *Ecological Restoration* 26:111-113.
- *Nagel, L.M., Corace, R.G. III and A. Storer. 2008. An experimental approach to testing the efficacy of management treatments for glossy buckthorn (*Frangula alnus*) at Seney National Wildlife Refuge, Upper Michigan. *Ecological Restoration* 26:136-142.
- *Corace, R.G. III, McCormick, D.L. and V. Cavalieri. 2006. Population growth parameters of a reintroduced trumpeter swan flock, Seney National Wildlife Refuge, Michigan, USA (1991-2004). *Waterbirds* 29:38-42.
- Probst, J.R., D. Donner, C.I. Bocetti and S. Sjogren. 2003. Population increase in Kirtland's warbler and summer range expansion to Wisconsin and Michigan's Upper Peninsula, USA. *Oryx* 37:365-373.
- *Corace, R.G. III, Goebel, P.C. and D.L. McCormick. 2010. Kirtland's warbler habitat management and multi-species bird conservation: considerations for planning and management across jack pine habitat types. *Natural Areas Journal* 30:174-190.
- *Kashian, D.M., Corace, R.G. III, Shartell, L.M., Donner, D.M. and P.W. Huber. 2012. Variability and persistence of post-fire biological legacies in jack pine-dominated ecosystems of northern Michigan. *Forest Ecology and Management* 263:148-158.
- *US Fish and Wildlife Service (R. G. Corace III primary author). 2013. Habitat Management Plan for Seney NWR. USFWS Regional Office, Fort Snelling, MN.
- *US Fish and Wildlife Service (R. G. Corace III primary author). 2013. Habitat Management Plan for Kirtland's Warbler WMA. USFWS Regional Office, Fort Snelling, MN.
- *US Fish and Wildlife Service (R. G. Corace III primary author). 2016. Inventory and Monitoring Plan, Seney National Wildlife Refuge. USFWS Regional Office, Fort Snelling, MN.

Map of public lands in the UP (will be provided)

Map of selected wildlife survey routes in Seney NWR (will be provided)

Map of invasive plants managed at Seney NWR (will be provided)

Ecological Database for Selected Trees of the UP (will be provided)

Field methods handouts.

I have read all the above and understand their integration with the job announcement and annual work plan for the Applied Sciences Program, Seney NWR:

Signature _____

Name of intern/graduate student/other: _____